In the Claims:

Please amend the claims as follows:

1. (currently amended) ~~Method~~ A method of tuning an arc welding system comprising an electric circuit ~~(2)~~ including a power source ~~(3)~~, and a control system ~~(20)~~ including computer means ~~(33)~~ and memory means ~~(34)~~, the method comprising~~;~~:

determining values of system input parameters of the electric circuit~~;~~ ~~(2)~~,

calculating tuning parameter values from these system input parameters by using a simulation model ~~(21)~~ of the arc welding system~~;~~ and

tuning the arc welding system by implementing the tuning parameter values into the control system ~~(20)~~, ~~characterized in that~~

wherein the simulation model ~~(21)~~ is calibrated to represent the actual welding situation by measurement of model parameter values on the welding station on site.

2. (currently amended) ~~Method~~ A method according to claim 1, wherein the calibration comprises a first calibration mode ~~including;~~ comprising:

short-circuiting ~~(14)~~ the electric circuit over the arc~~;~~:

sending a controllable current and voltage through the system~~;~~: and

measuring the resistances ~~(10, 12)~~ and the inductances ~~(9, 11)~~ of the electric circuit.

3. (currently amended) ~~Method~~ A method according to claim 1 ~~or 2~~, wherein the calibration comprises a second calibration mode ~~including;~~ comprising:

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empowering the welding station with full power to produce an arc (13);,

measuring the current (42) and the voltage (45) of the electric circuit;, and

adjusting the model so that predicted values (43, 44) matches match the measured values

(42, 45).

4. (currently amended) Method A method according to any of the preceding claims

claim 1, wherein the calibration comprises a third calibration mode including; comprising:

empowering the welding station with full power to produce an arc (13);,

performing a plurality of process modes by the control unit (20);, and

extracting the characteristic fingerprint pattern of the power source from measurement of

current and voltage under each of the performed process modes.

5. (currently amended) Method A method according to any of the preceding claims

claim 1, wherein the simulation model is brought to comprise a model component of the metal

transport between the electrode and the workpiece, the metal transport model is brought to

comprise a first model part of a region close to the wire, a second model part of the arc column,

and a third model part of the metal condensing in the region close to the workpiece.

6. (currently amended) Are An welding system, comprising:

an electric circuit (2) including a power source (3);,

a welding torch (4) with a consumable welding wire (35);,

a workpiece (6); and

a control system (20) comprising computer means, (34) and memory means, (35) and

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including means for tuning the arc welding system, ~~characterized in that the control system~~ ~~comprises~~ a simulation model of the arc welding system, means for calibrating the simulation model, input means ~~(46)~~ for receiving measured model parameter values, means for calculating tuning parameter values, and means for implementing these parameter values into the control system.

7. (currently amended) ~~Are~~ An arc welding system according to claim 6, wherein the arc welding system comprises an industrial robot ~~(1)~~ for operating the torch ~~(4)~~.

8. (currently amended) ~~Are~~ An arc welding system according to claim 6 ~~or 7~~, wherein the model parameters of the electric circuit ~~(2) comprises~~ comprise inductance ~~(9)~~ and resistance ~~(10)~~ of a first electric path ~~(7)~~, inductance ~~(11)~~ and resistance ~~(12)~~ of a second electric path, current and voltage of a process mode, and a correspondent behavior of the power source.

9. (currently amended) ~~Are~~ An arc welding system according to ~~any of claims 6-8~~ claim 6, wherein the control system ~~(20)~~ comprises computer means for controlling the welding process, and memory means for storing a plurality of synergic lines ~~(15)~~.

10. (currently amended) ~~Computer~~ A computer program product comprising instructions to influence a processor to perform a method according to claim 1 ~~to 5~~.

11. (currently amended) The computer program product according to claim 10 provided at least in part over a network such as the Internet.

12. (currently amended) ~~Computer~~ A computer readable medium containing a computer program according to claim 10.